Optimising EV Charging Efficiency

BY SURFING JELLYFISH

Hypothesis

- Find the optimal time over the next 24hrs to charge your EV, based on region
- Minimise wasted energy supply in the grid by using your EV battery as storage
- Charge with minimal carbon intensity and calculate the estimated price of charge

Problem

- Due to energy storage issues, there is often wasted renewable energy in the grid
- As EV uptake increases there will be additional demand on the grid so this should be monitored at a regional level.
- One of the biggest criticisms around EV transition is that they are charged via fossil fuel generation from the grid. We aim to charge at times of peak renewable electricity
- Consumers who are EV users will have more environmental concern so we are providing them with a solution that minimises their co2 emissions

The User Story
Primary user

US

- As an EV Owner
- I am environmentally conscious and want to minimise my emissions
- I also want to know the financial cost of charging my EV

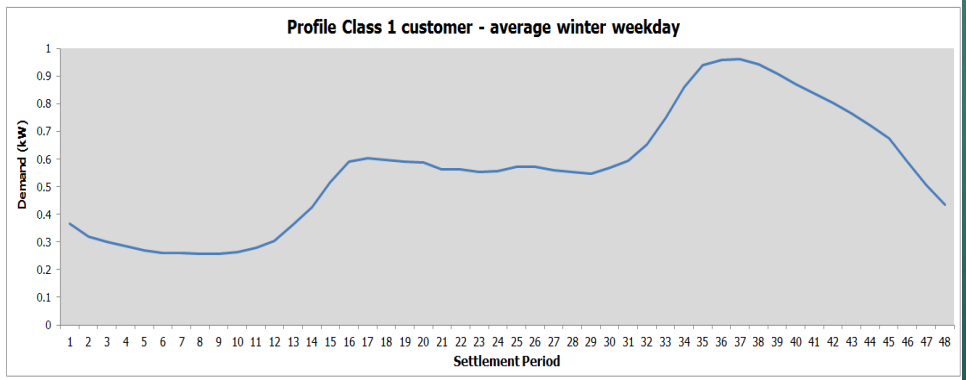
MVP

- We will deliver dashboard for the regional grid for them to be able to see trends and highlight best times for users to charge cars to avoid renewable energy wastage when supply is surplus.
- We will provide a platform where EV owners input a region and it will tell them the greenest time to charge in the next 24 hours.

- Demo of this dashboard in practice will now be presented
- Assumptions: London makes up 2% of demand, e7 tariff hours are 11pm-6am

Demand Data - BEIS

We filtered the BEIS historical consumption data by London postcodes to attempt to see expected demand for the region (London)
We weighted the data by winter and summer (4/7 and 3/7 based on rough estimates off BEIS website) however to improve further, we would require the Electron profiling data available at a cost for seasonality- yearly and daily. It Also available for each tariff type
We found that our BEIS demand distribution underestimated the supply forecasts

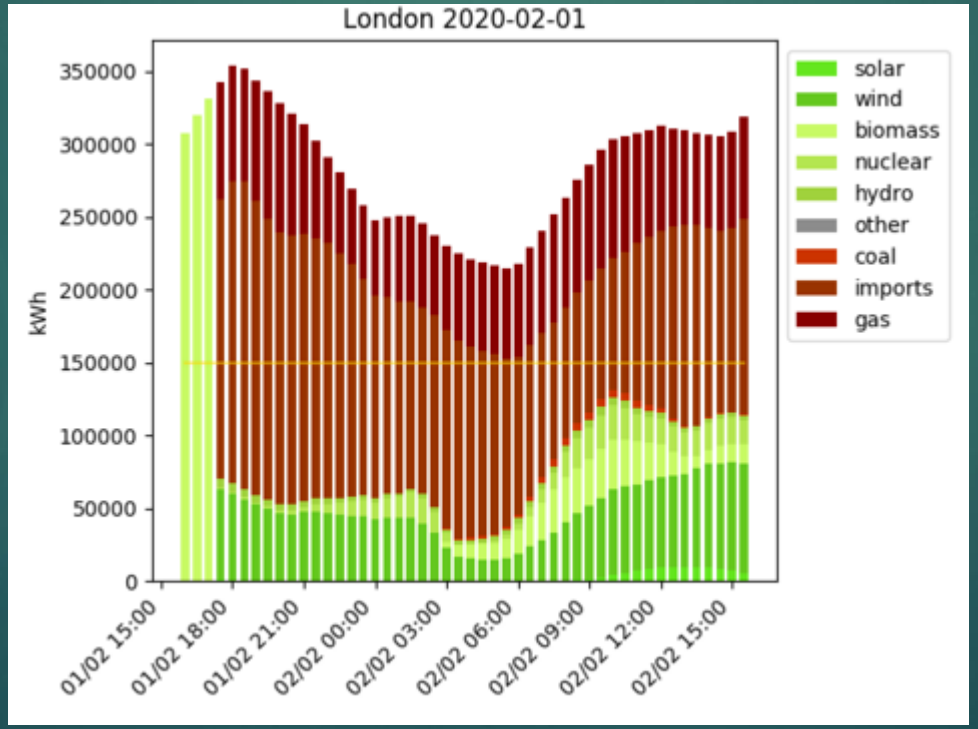


London	Winter Kwh	Summer Kwh
E7	151,040	113,280
Standard	116,822	87,617

Supply Data – National Grid

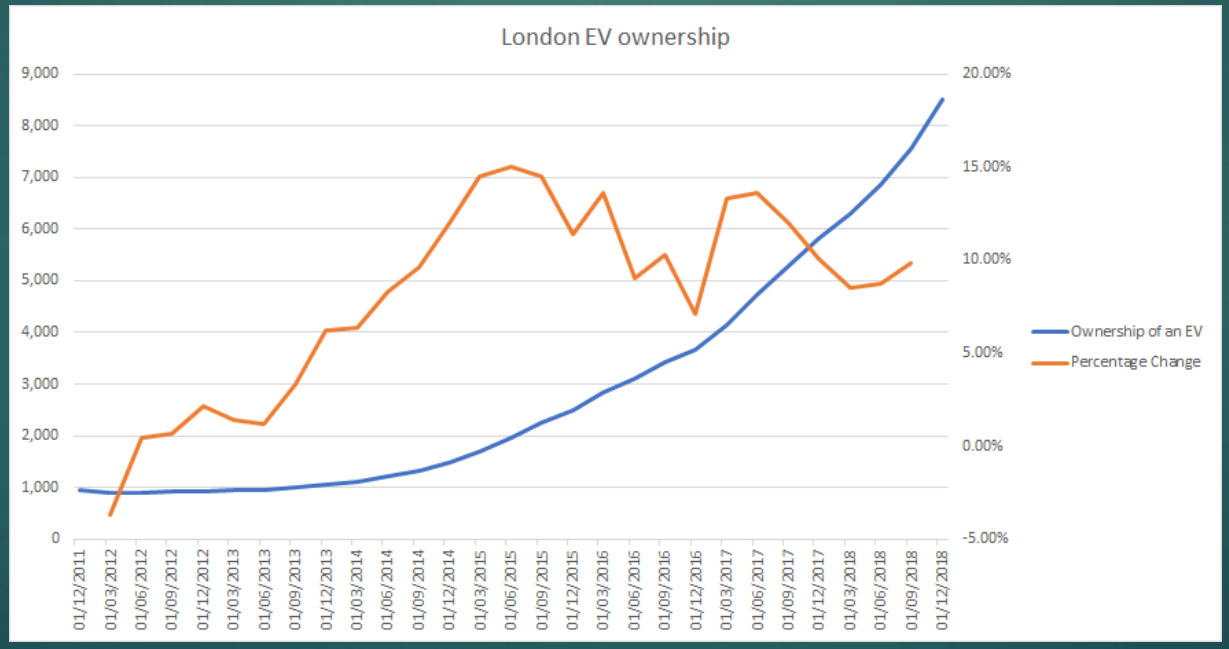
We used the Carbon Intensity API to forecast supply. For London, we assumed a constant 2% of national demand based on historic figures

Generation mix in percentages and carbon intensity data is available per region

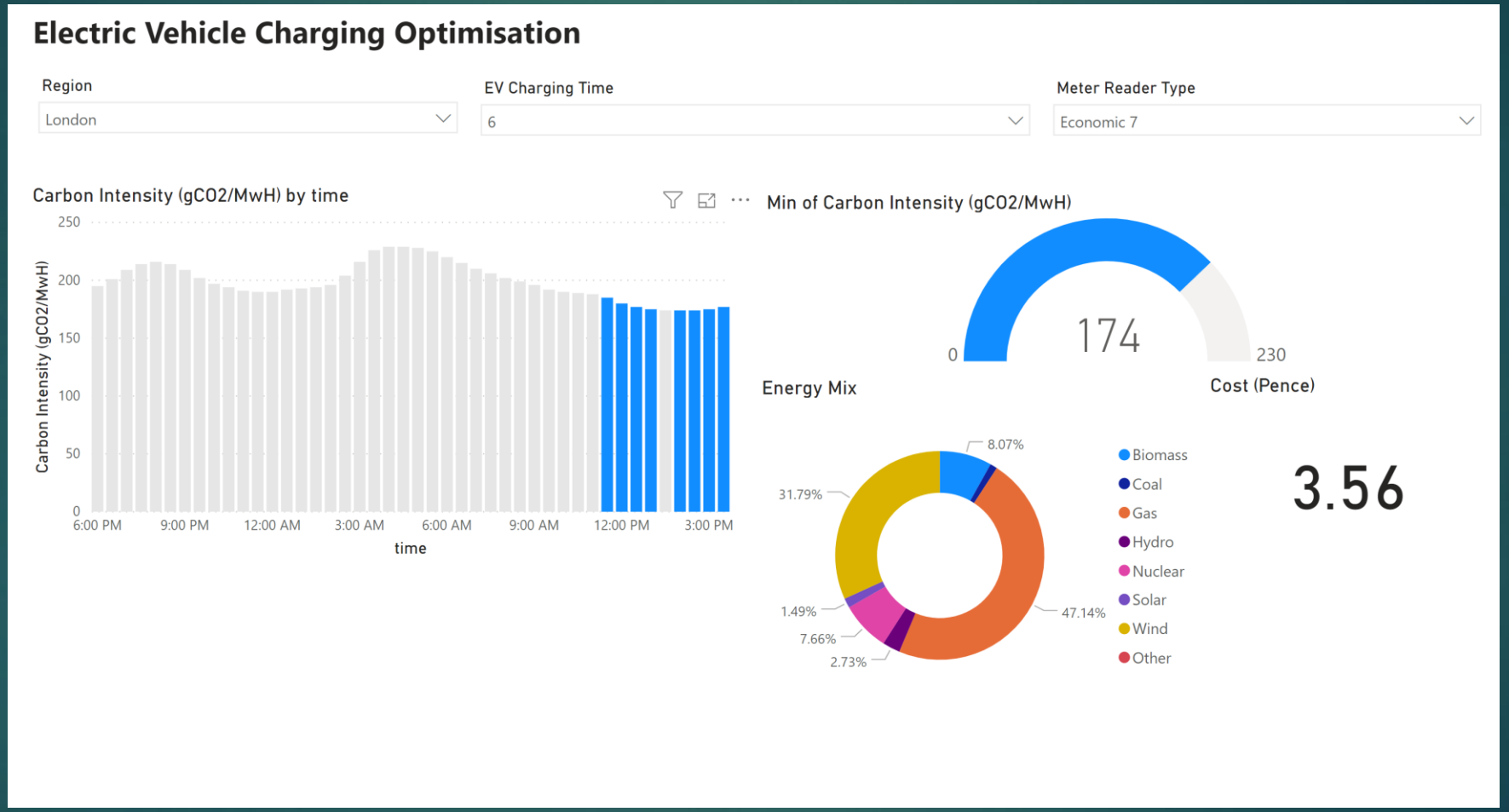


EV Data

We used the EV Tariff data to calculate average regional prices in p/kwh for both tariff types.
On a regional level, we can monitor the number of EV's that require charging based on gov ownership data to avoid correlation between the individual recommendations



Dashboard


Electric Vehicle Charging Optimisation
Region
London
EV Charging Time
6
Meter Reader Type
Economic 7
Carbon Intensity (gCO2/MwH) by time
Carbon Intensity (gCO2/MwH)
250
200
150
100
50
0
6:00 PM
9:00 PM
12:00 AM
3:00 AM
6:00 AM
9:00 AM
12:00 PM
3:00 PM
time
Min of Carbon Intensity (gCO2/MwH)
174
0
230
Cost (Pence)
Energy Mix
8.07%
31.79%
1.49%
7.66%
2.73%
47.14%
Biomass
Coal
Gas
Hydro
Nuclear
Solar
Wind
Other
3.56